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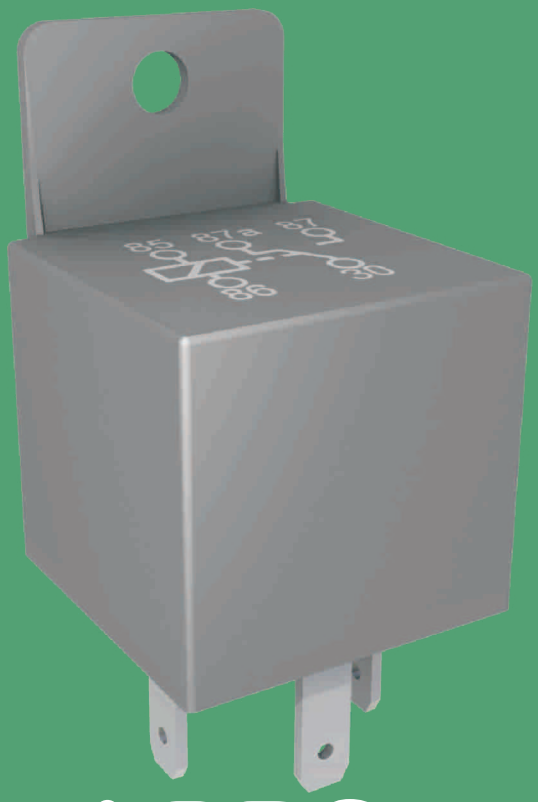
RSC-2

2 channel remote control



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RSC-2
2 Channel Remote Control
Update documents
2009-11-04 version 1.2

Designed to work with Keeloq
KEELOQ

Operating Manual & Applications Notes

http://docs.google.com/View?id=dhsr2cgs_31jm67s5v3

Dear Customer!

Before using RSC-2 remote control system, we ask you to become acquainted with the content of this manual. Acquired knowledge of operation and functions of the purchased RSC-2 remote control system will ensure proper functioning of the controller.

With our compliments,
LPRS Company.

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Glossary of basic terms:

BISTABLE MODE:
Each press of the key fob transmitter push-button changes the output to the opposite (switches the negative power supply on or off).

BISTABLE DEPENDENT MODE:
Each press of the key fob transmitter push-button switches on the negative power supply for selected channel with a simultaneous switch-off of the negative power supply for another channel.

MONOSTABLE MODE:
Each press of the key fob transmitter push-button switches on the negative power supply for selected channel at a previously programmed time.

MONOSTABLE DEPENDENT MODE:
Pressing the key fob transmitter push-button switches on the negative power supply for selected channel at a previously programmed time, with a simultaneous switch-off of the negative power supply for another channel if it was on at that time.

DYNAMIC CODE HOPPING "Keeloq®":
KeeLoq is a software data encoding system derived by Microchip Technology Inc., used for safe and confidential transmission of controlling messages from the key fob transmitter to the controller. The program contained in the key fob transmitter encrypts the data to prevent attempts of scanning and possible use of the information later. It ensures safety of data transmission in relation to other users of the same system. The encryption system is resistant to random and sabotage signals coming from other broadcasting devices, which are jammed at the radio reception stage.

PROGRAMMING:
This function allows to modify controller settings: logging/erasing of key fob transmitters, changing the operation mode to bistable or monostable, and the time setting.

General description

RSC-2 device allows the user for remote switching on and off electronic and electric devices using a key fob transmitter. Radio transmission used for communication between the key fob transmitter unit and the **RSC-2** controller is completely safe thanks to the application of **KeeLoq ®** encrypted data transmission system developed by **Microchip Technology Inc.** In terms of external design and dimensions, it corresponds exactly to commonly used relays: HFV4, HFV7A made by Hogfa, GRL-S-112D made by **Goodsky**, or the following models made by **Bosch** Minirelays: 332 019 103, 0 332 019 110, 0 332 019 109, 0 332 209 150, 0 332 209 138.
In order to fit the **RSC-2** controller, standard relay sockets installed in cars can be used for the aforesaid relays. **RSC-2** is a small but extremely functional device, containing two radio-controlled channels, which can operate in either dependent or independent mode, according to the software version.
RSC-2 controllers may co-work (as executive components) with other controlling/signaling units.

Primary functions of RSC-2

1. **KeeLoq ®** Dynamic code hopping technology made by Microchip Technology Inc.
2. Two channels working in either independent mode **RSC-2e** or dependent mode **RSC-2d** and **RSC-2f.**
3. Saving operating conditions of channels, configuration and logged key fob transmitters in EEPROM memory after disconnecting the power supply (up to 10 years).
4. Simple and convenient system configuration using a **K-2** programmer.
5. Possibility to set a channel into monostable mode with timing adjustable from 0.2 to about 600 seconds.
6. Signaling the registration of the last (6th) key fob transmitter in EEPROM memory.
7. Independent (reset) switch-off of a channel/channels using a 3-button key fob transmitter (e.g. Banan).
8. Channel outputs with overcharging and thermal protection.
9. Possibility to connect inductive devices, e.g. relays.
10. Controlling the negative power supply (open collector output).

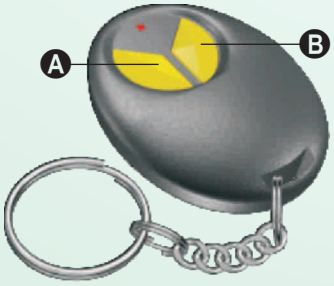
Versions of the RSC-2 radio controller

RSC-2d - remote controller with two dependent channels.
Press the **Main** push-button of the key fob transmitter to switch on the negative power supply on **channel 1** (simultaneously switching off the negative power supply on **channel 2**).
Press the **Functional** push-button of the key fob transmitter to switch on the negative power supply on **channel 2** (simultaneously switching off the negative power supply on **channel 1**).

RSC-2e - remote controller with two independent channels.
Press the **Main** push-button of the key fob transmitter to switch on/off the negative power supply on **channel 1.**
Press the **Functional** push-button of the key fob transmitter to switch on/off the negative power supply on **channel 2**.

RSC-2f - remote controller with two dependent channels.
Press the **Functional** push-button of the key fob transmitter to switch on the negative power supply on **channel 1** (simultaneously switching off the negative power supply on **channel 2**).Press the **Assistant** push-button of the key fob transmitter to switch on the negative power supply on**channel 2** (simultaneously switching off the negative power supply on **channel 1**).
The **Main** push-button of the key fob transmitter erases the active channel.

Key fob transmitter **"Alien"**



Key fob transmitter **"Ring"**

Key fob transmitter **"Duet"**

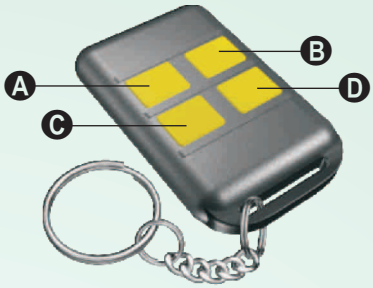
A **Main** push-button

B **Functional** push-button

Key fob transmitter
"Banan

Key fob transmitter
Lider

Key fob transmitter
"Quartet



C Assistant push-button

D Assistant 2 push-button

Functions of the key fob buttons working with **RSC-2d**

Key fob	Push-button **Main**	Push-button **Functional**	Push-button **Assistant**	Push-button **Assistant 2**
	switches on negative power supply on channel 1 switching off negative power supply on channel 2	switches on negative power supply on channel 2 switching off negative power supply on channel 1	-	-
ALIEN, DUET, RING	switches on negative power supply on channel 1 switching off negative power supply on channel 2	switches on negative power supply on channel 2 switching off negative power supply on channel 1	resets active channel	-
LIDER, QUARTET	switches on negative power supply on channel 1 switching off negative power supply on channel 2	switches on negative power supply on channel 2 switching off negative power supply on channel 1	resets channel 1	resets channel 2

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Functions of the key fob buttons working with **RSC-2e**

Key fob	Push-button **Main**	Push-button **Functional**	Push-button **Assistant**	Push-button **Assistant-2**
	switches on /off negative power supply on channel 1	switches on /off negative power supply on channel 2	-	-
ALIEN, DUET, RING	switches on /off negative power supply on channel 1	switches on /off negative power supply on channel 2	resets active channel	-
BANAN	switches on /off negative power supply on channel 1	switches on /off negative power supply on channel 2	resets channel 1	resets channe 2
LIDER, QUARTET				

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Functions of the key fob buttons working with **RSC-2f**

Key fob	Push-button **Main**	Push-button **Functional**	Push-button **Assistant**
	resets active channel	switches on negative power supply on channel 1 switching off negative power supply on channel 2	switches on negative power supply on channel 2 switching off negative power supply on channel 1
LIDER, QUARTET	resets active channel	switches on negative power supply on channel 1 switching off negative power supply on channel 2	switches on negative power supply on channel 2 switching off negative power supply on channel 1
BANAN			

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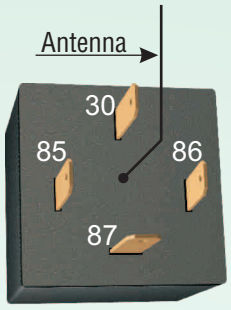
Description of RSC-2 controller outputs

Control outputs:
No **30:** channel 1
No **87:** channel 2.

Power inputs :

No **85:** battery plus (+12 VDC).
No **86:** battery minus (ground).

Antenna: **(**do not cut !**)**
The wire antenna should be left free lying or hanging, dependent on the fitting conditions. Do not connect or group with other wires. It has a direct influence on the functioning of the key fob transmitter.



RSC-2 viwed from the output side

Figure 1

RSC-2 external design

Figure 2

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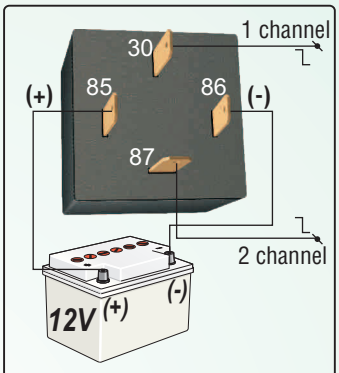
Fitting the RSC-2 radio controller
Before starting to fit the controller, it is recommended to pay special attention to the proper connection of its power outputs.

Connect the power supply to the controller using female connectors inserted onto the output leads. Solder the female connector or tighten the clamps on the wires of the controlled device. It is recommended to follow the connection pattern closely to avoid damaging the controller.

Female connector
Figure 3



RSC-2 outputs
(connection side view)

Figure 4

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Power support for **RSC-2** controllers (Fig.5) can be used for connecting.

You must NOT solder the wires to the output leads. Soldering wires can cause controller damage and loss of warranty.

RSC-2 controllers have, by standards, male output connector leads, which are powered with 12VDC voltage.
An example connection diagram is shown on Fig.6 and 7.

Power support for RSC-2 controllers
Description of the output leads of the support:
Red: 0.75mm in diameter (coupled wire): +12VDC power supply
Black with a red strap: 0.75mm in diameter (coupled wire): negative power supply.
Two loose black wires, 1.5mm in diameter: outputs for channels 1 and 2.

RSC-2 Power support
Figure 5

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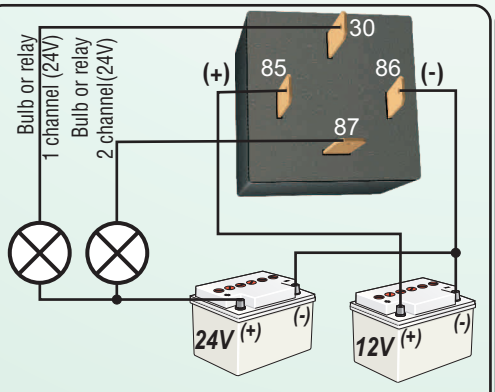
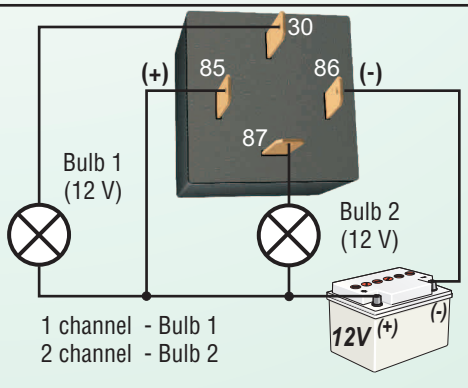


Example connection diagram:
RSC-2 for controlling 24V bulbs
Figure 6



Example connection diagram:
RSC-2 for controlling 12V bulbs
Figure 7

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K-2 programmer

A **K-2** programmer allows to change current settings of **RSC-2** controllers.
By means of this programmer, installer can check the functioning of the controller and change settings to suit user's needs. A schematic diagram of the configuration process is shown below.

Position ❶: Delete existing key fob transmitters and logg new ones
(signalling: LED diode blinks once in 3 seconds)

Position ❷: Bistable mode setting
(signalling: LED diode blinks twice in 3 seconds)

Position ❸: Monostable mode setting
(signalling: LED diode blinks three times in 3 seconds)

Position ❹: Time registration for monostable mode
(signalling: LED diode blinks four times in 3 seconds)

K-2 programmer
Figure 8

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Operation of the K-2 programmer

When the S-1 push-button of the **K-2** programmer is being pressed, voltage between 0.45V and 0.65V will appear between controller outputs no. **86** and **87**. Introducing this requirement protects the **RSC-2** controller from accidental entering configuration mode during standard operation of the controller.

Connecting the K-2 programmer to the RSC-2 controller

To connect the **K-2** programmer to the **RSC-2** controller:
a) disconnect the power supply from the **RSC-2** controller
b) disconnect the **RSC-2** controller from the controlled circuit
c) connect the programmer to the **RSC-2** controller, according to the numbering of outputs.

IMPORTANT ! Before pressing the S-1 push-button, check if LED-2 diode of the programmer is turned off. LED-2 turned on makes it impossible to configure the **RSC-2** controller. To turn off the LED-2 in **RSC-2e**, press the **Functional** push-button on the key fob transmitter. To turn off the LED-2 in **RSC-2d** and **RSC-2f**, press the **Main** push-button on the key fob transmitter.

While configuring between position 2 and 4, only logged key fob transmitters should be used in the **RSC-2** controller.

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Configuration of the RSC-2 radio controller:

To enter configuration mode:
a) Press and hold the S-1 push-button of the **K-2** programmer until **LED-1** diode turns on and a simultaneous sound signal occurs.
b) When **LED-1** diode has turned on in the **K-2** programmer, release the S-1 push-button.
After entering configuration mode, **LED-1** of the **K-2** programmer and the buzzer will turn on simultaneously every 3 seconds for 0.5 second, which means that the programmer is at position ❶ in the configuration process.

Important ! Pressing any of the key fob transmitter buttons for the first time will cause its logging and deleting all key fob transmitters logged so far in the EEPROM memory of the RSC-2 controller.

Logging key fob transmitters: position ❶ in the configuration process.
If you intend to logg a key fob transmitter, press any key on the first key fob transmitter and hold it until **LED-1** blinks twice and there is a buzzer signal. Such a signalling indicates logging the key fob transmitter in the controller memory. The procedure is the same for the following key fob transmitters.

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Important ! Up to 6 key fob transmitters can be logged in the controller. While attempting to logg a seventh transmitter, the controller will indicate the end of the process of logging key fob transmitters by a short blink of **LED-1** and buzzer 0.5 second once every 1 second.

a) If you wish to exit configuration mode, disconnect power supply from the **K-2** programmer for at least 5 seconds
b) If you wish to move to the next, ❷ position in the configuration process, press the S-1 push-button of the **K-2** programmer: **LED-1** of the programmer and the buzzer will turn on simultaneously, twice every 3 seconds for 0.5 second.

Setting bistable mode: position ❷ in configuration process
To set bistable mode for channel 1, press for a short time the **Main** push-button on the key fob transmitter: double simultaneous signaling by **LED-1** and the buzzer informs about setting channel 1 into bistable mode. To set bistable mode for channel 2, press the **Functional** push-button on the key fob transmitter: double simultaneous signaling by **LED-1** and the buzzer informs about setting channel 2 into bistable mode.
a) If you wish to exit the configuration procedure, disconnect the power suply of the **K-2** programmer for at least 5 seconds

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b) If you wish to move to the next, ❸ position in the configuration process, press the S-1 push-button of the **K-2** programmer for a short time: **LED-1** diode of the **K-2** programmer and the buzzer will turn on simultaneously, 3 times every 3 seconds for 0.5 second.

Important !

For **RSC-2f** version:
Channel 1 is assigned the **Functional** push-button on the key fob transmitter.
Channel 2 is assigned the **Assistant** push-button on the key fob transmitter.

Setting monostable mode: position ❸ in the configuration procedure.
To switch into monostable mode for channel 1, press the **Main** push-button on the key fob transmitter for a short time: double simultaneous signaling by **LED-1** and the buzzer indicates setting channel 1 into monostable mode. To switch into monostable mode for channel 2, press the **Functional** push-button on the key fob transmitter for a short time: double simultaneous signaling by **LED-1** and the buzzer indicates setting channel 2 into monostable mode.
a) If you wish to exit the configuration procedure, disconnect the power supply of the **K-2** programmer for at least 5 seconds
b) If you wish to move to the next, ❹ position in the configuration process, press the S-1 push-button of the **K-2** programmer for a short time :**LED-1** diode of the **K-2** programmer and the buzzer will turn on

simultaneously, 4 times every 3 seconds for 0.5 second.

Important!

For **RSC-2f** version:
Channel 1 is assigned the **Functional** push-button on the key fob transmitter.
Channel 2 is assigned the **Assistant** push-button on the key fob transmitter.

Time registration in the monostable mode: position ❹ in the configuration procedure
To record the time for a selected channel in monostable mode, press the selected push-button on the key fob transmitter - time recoding will begin: LED-1 and the buzzer will turn on for the time of recording. Pressing the same push-button on the key fob transmitter again will finish time recording: LED-1 and the buzzer will turn off. double signaling by LED-1 and the buzzer indicates saving registered time in non-volatile EEPROM memory. Repeated pressing of the selected key fob transmitter push-button will restart the time registration procedure.In case of time registration for the next channel proceed as described above.
a) If you wish to exit the configuration process, disconnect the power supply of the **K-2** programmer for at least 5 seconds.
b) Press the S-1 push-button of the **K-2** programmer for a short time to move to the first position in the configuration. A schematic diagram of moving around the programming procedure is shown on page 17.

Exit the configuration procedure
To exit the configuration procedure, disconnect the power supply for at least 5 seconds. All changes in the configuration will be saved automatically. Turning on the power supply of the controller or a programmer together with the controller allows to check the functioning after making changes in the configuration.

Important!

While checking the operation of the controller, do not press the S-1 push-button of the programmer.
Only key fob transmitters logged in the controller should be used.

Factory settings of the controllers RSC-2d, RSC-2e, RSC-2f:

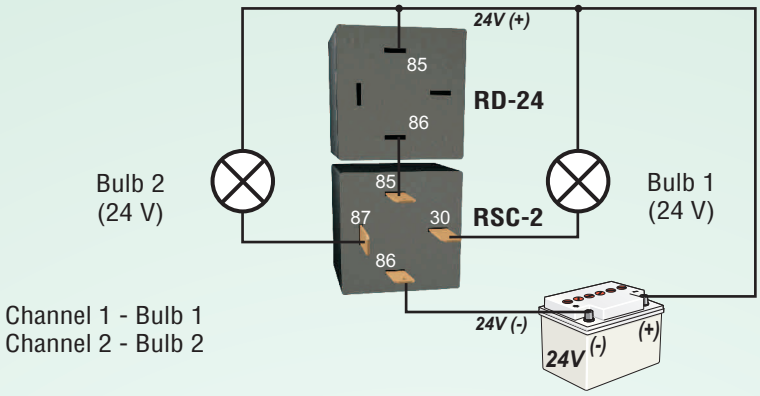
☑ Logged two key fob transmitters, ☑ monostable mode 1 and 2 channel, ☑ time one secod.

RD-24 voltage reducer
Powering **RSC-2** controllers with 24VDC
RSC-2 controllers are to be powered with 12VDC, however, controlling elements can function in 24VDC installations. To adjust **RSC-2** controllers to 24VDC installation, voltage reducer must be connected serially with the controller.
RD-24 is a simple circuit with current yield of 70 mA, ensuring correct functioning of **RSC-2** controllers, while maintaining connection pattern compliant with the diagram (Fig.10).
In case of powering the controller with 24VDC, the use of the voltage reducer is absolutely required.

Important!

The connection diagram must be followed to avoid controller damage.

RD-24 External design
Figure 9



RSC-2 adjusted to 24V with the use of the RD-24 voltage reducer
(viewed from the **RSC-2** output side).
Figure 10

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Basic technical data:

Average range of key fob transmitters (measured in open space and at low interference level)	30 m, ± 30%
Average A23 battery type service life	6 do 12 month
Recommended range of correct operation temperatures	-20 do +60˚C
Uz: supply voltage rating:	+10 V do +18 V DC
Data encoding system: **KeeLoq®, Microchip Technology Inc**	7,3 x 10^{19}
Data transmission frequency of key fob transmitters	433.92 MHz ± 5%
Sensitivity of radio receiver (super reactive)	-85 dbm, ± 10%
Key fob transmitter average emitting power	max 5 mW, ± 30%
Maximum continuous supply current (open collector)	Imax 2 A

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TERMS OF WARRANTY

The producer is obliged to repair the device free of charge if, during the warranty period, flaws occur due to a producer's fault.
The warranty includes a 12-month periond since the date of purchase. The warranty will not be accepted in the following cases:
exceeding admissible values of electric current and voltage (included in the manual), operating the device without accordance to the manual, inappropriate fitting and use, making any repairs on one's own, flooding the device with water or any other liquid, tearing or breaking the warranty seal, changing the warranty card, or lacking the document proving the purchase (receipt, invoice).
After-warranty service and technical examination of the delivered equipment is paid. In the case of complaint, the complete device together with remote controllers and the description of the defect, warranty card, return address and telephone number should be delivered to the point of sale (fitting) first, and in an emergency situation - to the producer.

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Decision of the Corado Service concerning warranty repairs is final. Warranty does not include: batteries, equipment and remote control casings, and bundles of wires attached to the equipment.
In case of losing or damaging the Warranty Card, copies will not be issued. Corado takes no material or legal liability for losses resulting from automatic damage of the equipment, random accidents, third-party interferences or inappropriate fitting. Filling in all points contained in the warranty and a readable customer's signature are basic conditions while examining the request for warranty repairs.

Corado declares that the product has been designed and produced compliant with:

CE

- safety of use norm **EN 60950-1**
- electromagnetic compatibility norm **EN 301 489-1**
- radio requirements compliance norm **EN 300 220-3**

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Date of delivery for repair	Range of repair	Date, serviceperson signature

29

Date of delivery for repair	Range of repair	Date, serviceperson signature

30

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Version of controller **RSC-2**.....

Date fitt or sale.

year month day

2 0

Stamp installer or shop

signture of installer

I know about using device, present settings of controller and terms of guaranty.

date and signature of customer

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